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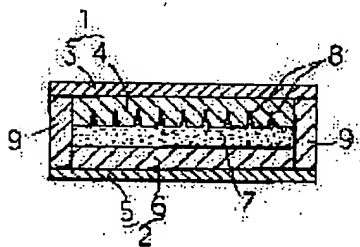
(54) LITHIUM SECONDARY BATTERY

(57)Abstract:

PURPOSE: To provide high life extension by providing notched grooves of prescribed depth with a prescribed space in a surface layer of a positive electrode active material, so as to prevent a discharge capacity from decreasing.

CONSTITUTION: An electrolyte, impregnated in a retainer 7 formed of polypropylene-made nonwoven fabric, is arranged between a positive electrode active material 4 and a negative electrode active material 6, and many notched grooves 8 are provided with a prescribed space in a surface of the positive electrode active material 4 opposed to the retainer 7. In this way, expanding/ contracting the positive

electrode active material according to cycle progress of charge/discharge are relaxed,



and separating and detaching the positive electrode active material from a collector can be prevented. Consequently, decreasing a discharge capacity is prevented, and high life extension of a battery can be attained. By providing the groove 8 in the surface layer of the active material 4 in depth of at least 50% or more the total thickness from this surface, also decreasing a capacity in the cycle initial period can be reduced. Further by setting a space of the grooves 8 to 3mm or less, capacity decrease of the cycle initial period is reduced. and stable cycle transition can be obtained.

[Example]

The lithium secondary battery of this example comprises a positive electrode plate 1 and a negative electrode plate 2 and these electrodes are arranged so as to face each other, shown in Figure 1. In the positive electrode 1, positive active material 4 is held on one side of a positive current collector 3. In the negative electrode plate 2, negative active material 6 is held on one side of a negative current collector 5. Electrolyte seeping into a retainer 7 made of polypropylene non-woven fabric is arranged between the positive active material 4 and the negative active material 6. On the surface of the positive active material 4 facing to the retainer 7, many grooves 8 are prepared at a prescribed interval.

In lithium secondary cell of this example, many grooves 8 are prepared at a prescribed interval and check pattern on the surface of the positive active material 4 facing to the retainer 7, as shown in Figure 1. The condition of the grooves 8 was shown in Table 1 as NO.1~NO.5. In the Table 1, the interval of the grooves 8 was fixed(3 mm) and the depth of the grooves was changed.

[Table 1]

No.	Pitch	Depth (%)
1	3 mm	100
2	↑	75
3	↑	50
4	↑	25
5	Not prepared	Not prepared

The thickness of the positive active material 4 was 100 μ m and the depth of the grooves 8 shown in Table 1 is the ratio of the depth from the surface to the thickness of the positive active material 4.